ception already noted. However, I think one can be fairly safe in saying that these deposits were laid down during the late Pleistocene epoch. It is always necessary to bear in mind while discussing the Pleistocene of the tropics that no pronounced change between it and the Recent took place. Probably the age of these deposits could be more surely determined if one had a complete collection of all the fossils which are to be found in the two beds.

BOTANY.—Pedilospora dactylopaga *n.sp., a fungus capturing and consuming testaceous rhizopods.*[1] CHARLES DRECHSLER, Bureau of Plant Industry.

In permitting the development of a microscopic fauna, however restricted in variety of types, agar plate cultures made for the purpose of isolating fungi from diseased rootlets and other decaying plant materials, often afford a tolerably abundant growth of adventitious fungi destructive to different species of the more minute terrestrial invertebrates. As the destruction takes place in a transparent substratum the parasitic and predacious relationships are conveniently exposed to view. Fungi that on a natural substratum show only their aerial conidial apparatus, and would therefore ordinarily be taken, indeed, in some cases have long been taken, for saprophytes, are revealed in their true carnivorous character. Very probably because nematodes and amoebae of various species multiply most freely in agar plate cultures, instances of predacious and of parasitic activity involving these animals as prey or as hosts can be more frequently seen than instances of destruction of other microscopic animals. The capture of two species of testaceous rhizopods identified as *Difflugia globulosa* Duj. and *Trinema enchelys* Ehrenb. that I had opportunity to observe recently, provides therefore an element of novelty which is accentuated by the curious morphology of the fungus concerned.

As on agar plate cultures at least, the two rhizopods mentioned, like most other shelled protozoans, are decidedly sluggish in movement, their capture entails no violent struggle. That *Trinema enchelys* does not accept its fate altogether passively is indicated in the overturned posture of many a specimen, the mouth of which is directed upward rather than downward as normally. Except for such abnormal posture, captured animals are to be distinguished for the most part only by what on cursory examination would seem to be ordinary contact with a short branch on one of the superficial fila-

[1] Received June 18, 1934.

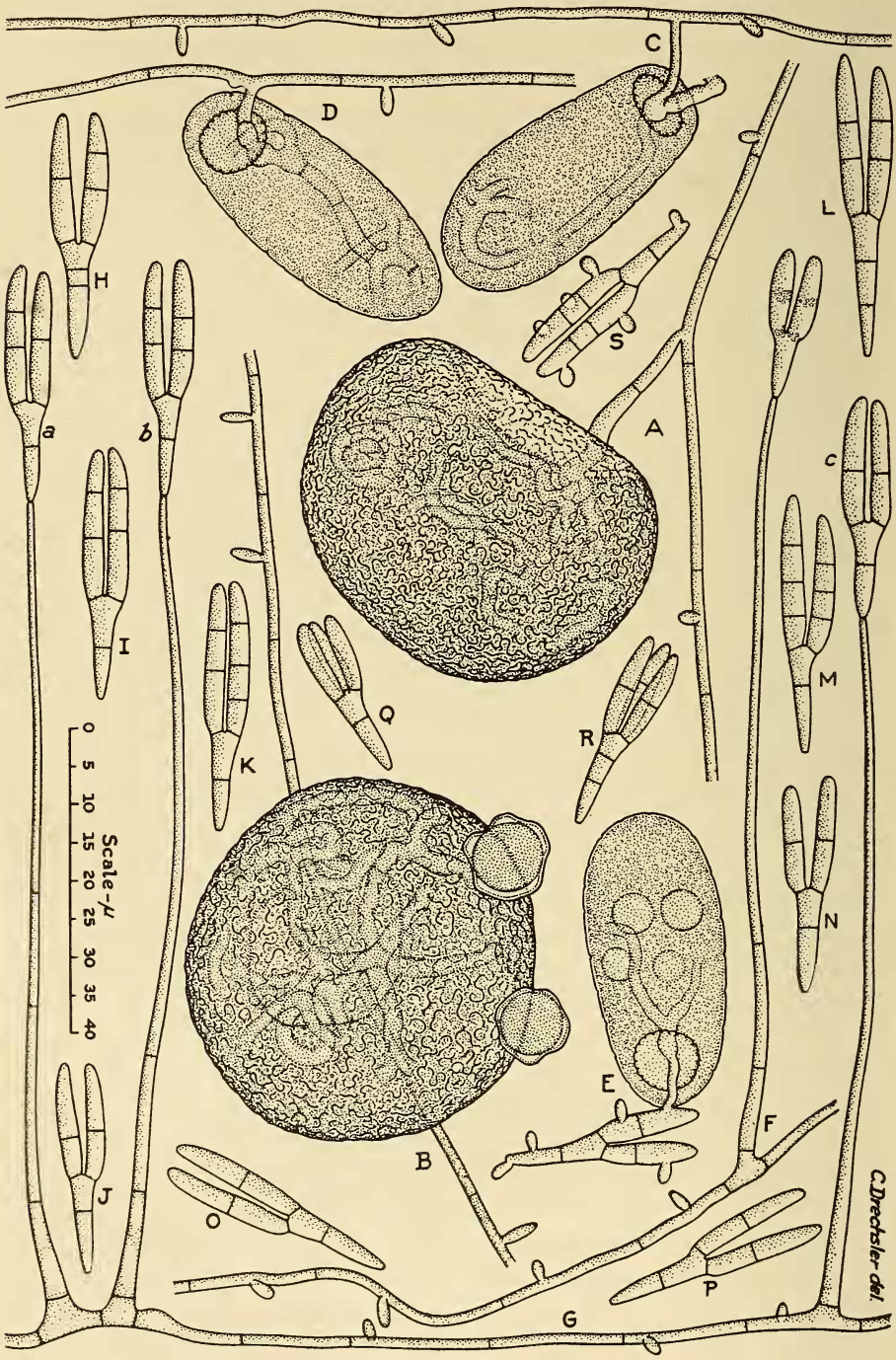

Fig. 1. *Pedilospora dactylopaga*. For explanation see opposite page.

ments that make up the sparse mycelium of the fungus. On closer examination the reason for the persistence of the contact, and the resultant immobility of the rhizopod, becomes sufficiently evident in that the branch is revealed as not merely being in contact with the animal at the unprotected mouth region, but as having penetrated into the protoplasmic interior and developed there a branched endozoic mycelium. This endozoic mycelium, which, as might be expected, attains a greater extension in the bulky *Difflugia* (Fig. 1, A, B) than in the smaller *Trinema* (Fig. 1, C, D, E), gradually exhausts the protoplasm within which it ramifies, until the crumbling or collapse of the enveloping testa announces the completed destruction of the prey.

Though *Difflugia globulosa* and *Trinema enchelys* are sluggish in movement it is yet hardly to be supposed that they could in their normal progression be successfully invaded even by a rapidly growing fungus, much less by a form as slow in linear extension as the one here concerned. The animals evidently must be held in their tracks by some special means until internal mycelial development is well started. This means is clearly provided in the digitate or elliptical diverticulations that are attached to the superficial mycelial filaments at moderate intervals (Fig. 1, A–D, F, G), or, following development somewhat analogous to germination, project in closer arrangement and in numbers, usually up to a half-dozen from detached conidia (Fig. 1, E, S). Frequently the membrane at the tip of the diverticulation appears as if thickened somewhat, but this appearance is better interpretable as due to a deposit of adhesive material than as resulting from local reinforcement of the wall. The branch connecting a well invaded animal with a mycelial filament is usually considerably longer than an undisturbed diverticulum (Fig. 1, A, C–E). An engaged diverticulum manifestly grows out a variable distance before penetration is effected.

Fig. 1. *Pedilospora dactylopaga*, drawn from material developed in mixed culture on maizemeal agar, with the aid of a camera lucida, at a uniform magnification; ×1000. A.—*Difflugia globulosa*, shown in lateral aspect, captured on a hypha of the fungus with endozoic mycelium partly visible. B.—Another specimen of *Difflugia globulosa* captured on a hypha, but shown in dorsal aspect; internal mycelium partly visible; the two irregularly globose bodies representing adhering cysts of a smaller protozoan. C, D.—Captured specimens of *Trinema enchelys*, the mycelium developed internally partly showing through the testa of each animal. E.—*Trinema enchelys* captured on a conidium beset with organs of capture. F.—Portion of hypha bearing 4 organs of capture and a conidiophore on which is borne an immature conidium. G.—Portion of hypha with 3 organs of capture and 3 conidiophores, each of the latter bearing a conidium, *a*, *b*, *c*, respectively. H–P.—Conidia of usual bifurcate type showing variations in size and shape. Q, R.—Conidia of less frequent tridental type. S.—Conidium bearing 6 organs of capture resulting from a process analogous to germination.

Here and there from the prostrate hyphae of the sparse mycelium arise singly or in small groups delicate erect conidiophores, about .1 mm. high, on which solitary pluriseptate bifurcating conidia with parallel or slightly divergent lobes are borne terminally. The characteristic shape of the conidia clearly refers the fungus to *Pedilospora*, a genus erected by Höhnel (10) on a species, *P. parasitans*, that he had found presumably parasitic on an ascomycete identified provisionally as *Helotium citrinum* (Hedw.) Fr. A similar biological relationship was attributed to two congeneric forms described later, *P. ramularioides* Bubák being recorded by its author (2) as a parasite on the mycelium of *Bispora pusilla* Sacc., and *P. episphaeria* Höhnel (11) as possibly a parasite of *Nectria cucurbitula* Fr. It would be easy to infer that the three described species differ widely in biological relationship from the predacious form under consideration, yet the possibility is hardly to be ignored that the parasitism noted by Höhnel and by Bubák may have been more apparent than real. Fruiting bodies of such ascomycetes as *H. citrinum* and *N. cucurbitula* often harbor a respectable microscopic fauna especially under moist conditions and in stages following maturity; and a filamentous fungus destructive to representatives of this fauna could hardly fail to present much the appearance of a parasite on the underlying living substratum.

However, from a consideration of morphological features there can be little doubt that the present fungus is indeed different from any of the three previously described congeners. The range in length of conidium is given as 13 to 16μ in *Pedilospora parasitans*, as 12 to 18μ in *P. ramularioides*, and as 11 to 18μ in *P. episphaeria;* whereas in the present form this dimension varies usually between 20 and 40μ, with the average lying close to 30μ. More important perhaps than the mere excess in length is the fact that most of this excess is accounted for in a proportionately much greater length of the basal portion of the conidium. In *P. parasitans* this part is described as obconical; in *P. episphaeria* as biconical and as measuring 3 to 3.5μ both in length and in width; in *P. ramularioides* as usually tetrahedral, the figures accompanying the text showing approximate equality of length and width. Obviously, in the species dealt with by Höhnel and by Bubák the basal part of the conidium consists of a small isodiametric cell just large enough to serve as junction of the two lobes that together make up by far the greater bulk of the spore.[2] In the fungus

[2] Since the present paper was submitted for publication, a contribution by Z. Gizhitska (Novitates pro flora mycologica. Visnik Kiivs. Bot. Sadu [Bull. Jard. Bot.

under discussion, it is usually rather little inferior in length or in bulk to either of the lobes (Fig. 1, G, *a*, *b*, *c;* H–M; O; P; S) and sometimes equals (Fig. 1, N, R) or even slightly exceeds (Fig. 1, Q) the latter in these respects. Associated with the greater length is the presence usually of 1 and less frequently of 2 (Fig. 1, H, L, R) cross-walls. The 2 or 3 axial segments resulting from this septation are of about the same size as the 2, 3 or 4 cells into which each of the lobes is divided through the insertion of 1 (Fig. 1, E; G, *c;* J; N; O; P; R), 2 (Fig. 1, I, L, S) or 3 (Fig. 1, M) septa respectively. As in the congeneric species each of the lobes is constantly delimited from the axial part by a septum. The number of cells in a conidium thus varies from 5 to 11, with 8, distributed as in the specimen shown in Figure 1, I—2 in the basal part and 3 in each lobe—representing the condition to be regarded as perhaps most nearly typical.

Although bilobate conidia having the general shape of a tuning-fork easily predominate, specimens with 3 lobes and thus suggestive of a trident, are not of rare occurrence (Fig. 1, Q, R). Similar tridental conidia were described and figured by Bubák for *Pedilospora ramularioides*, and were mentioned as occurring occasionally also in *P. episphaeria*. The monopodial development of the conidiophore ascribed to these two species has never been observed in my fungus, but might possibly occur under conditions encouraging more abundant sporulation than was afforded by the somewhat scanty supply of shelled rhizopods available in my cultures. In pure culture on artificial media like maizemeal agar, sporulation is generally even more meager than in mixed culture, and sometimes is completely absent. In pure culture, moreover, the undisturbed mycelium and conidia are entirely devoid of the digitate protuberances that evidently represent special organs of capture, a fact not only of much biological interest in itself, but expressive, too, of a physiological parallelism with the various nema-capturing species of *Trichothecium*, *Dactylaria*, *Arthrobotrys*, *Dactylella* and *Monacrosporium* whose consistent failure to produce captivating apparatus in pure culture was referred to earlier (6). In spite of the protuberances being dependent for their production on special ecological conditions, a specific term having reference to them may appropriately bring into relief the predacious

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Kyiv] **16**: 43–44. 1 pl. 1933) has been received, wherein a new species is described under the binomial *Pedilospora jaczewskii*. In this species, as in the three described earlier, the two conidial lobes arise from a single, short, relatively small, pentagonal basal cell. Accordingly the same considerations setting the American fungus apart from the species described by Höhnel and by Bubák, serve to set it apart also from the Ukrainian species.

character of the fungus, which seemingly deserves recognition as a new species.

Pedilospora dactylopaga sp. nov.

Mycelium sparsum, repens, parce ramosum; hyphis sterilibus 1.2–2.2μ crassis, hyalinis, mediocriter septatis, hinc inde saepius ad intervalla 15–50μ tubera digitiformia vel elongato-ellipsoidea 2.5–5$\times$1.2–2.2μ verisimiliter glutinosa emittentibus, his tuberibus animalcula capientibus, in eadem penetrantibus et ramos intus evolventibus; hyphis fertilibus paucis, hyalinis, parce septatis, plus minusve erectis, 75–125μ altis, basi 2–3μ crassis, sursum attenuatis, apice circa 1μ crassis. Conidia acrogena, solitaria, hyalina, 20–40μ (saepius circa 30μ) longa, 4–10-septata (typice 7-septata), bilobato-furcata vel interdum trilobato-furcata; parte infera continua vel bi- vel triloculari (typice biloculari), saepius nonnihil breviore quam lobis sed interdum eisdem aequali; lobis 2.5–3.5μ crassis, raro continuis, saepius bi- usque quadrilocularibus (typice trilocularibus), parallelis vel nonnihil divergentibus.

Habitat in radicibus putrescentibus, Difflugiam globulosam et Trinemam enchelyn capiens et consumens, in Washington, D.C.

Mycelium sparse, creeping, rather scantily branched; the vegetative hyphae 1.2 to 2.2μ wide, hyaline, septate at moderate distances, bearing at intervals usually of 15 to 50μ digitate or elongate-elliptical, apparently adhesive protuberances, and by means of these protuberances capturing protozoans, penetrating into them and giving rise to branches inside; conidiophores rather few in number, sparingly septate, hyaline, more or less erect, 75 to 125μ in height, 2 to 3μ wide at the base, tapering toward the tip to an apical diameter of about 1μ. Conidia acrogenous, solitary, hyaline, 20 to 40μ (mostly about 30μ) long, 4- to 10-septate (typically 7-septate), bilobate-furcate or occasionally trilobate-furcate; the lower part consisting of 1 to 3 cells (typically of 2 cells), usually somewhat shorter than the lobes but occasionally equal to them in length; the lobes parallel to or slightly divergent from one another, 2.5 to 3.5μ wide, rarely continuous, mostly consisting each of 2 to 4 (typically of 3) cells in linear arrangement.

Isolated from agar plate cultures started from decaying rootlets collected in Washington, D.C., in which cultures it was found capturing and consuming *Difflugia globulosa* and *Trinema enchelys*.

Höhnel held that *Pedilospora parasitans* could perhaps be most advantageously included in the Mucedineae-Staurosporae. This opinion was carried into effect by Saccardo (14) to whom among compilers the problem of disposing of the genus *Pedilospora* seems first to have presented itself. A similar disposition was made, though with expressed misgivings, by Lindau (12), and more recently again by Clements and Shear (3). In all probability only the outward shape of the conidium was considered by these authors, yet suggestions are not absent that some of the genera with which *Pedilospora* was thus brought into juxtaposition are in whole or in part naturally related to it. The original description of *Trinacrium subtile* Riess given by Fresenius (8), for example, makes mention of sparse mycelial growth

overlying a more robust fungus (*Stilbospora* sp.), thereby supplying a parallelism in habit as well as in habitat to supplement the morphological resemblance between the typically triradiate conidia distinctive of *Trinacrium* and the trilobate conidia occurring, even if only occasionally, in *P. ramularioides*, *P. episphaeria* and *P. dactylopaga*. The delicate, scarcely visible effuse mycelium and the trident-shaped conidia mentioned by Preuss (13) in his diagnosis of *Tridentaria alba* suggest likewise a general parallelism which is not contradicted in the reported occurrence of the fungus on moist decaying stems of *Brassica oleracea* Linn.,—a substratum that could be expected to favor the development of an abundant microscopic fauna, and therefore to provide a rich field for predacious activity.

While for the present the relationships of *Pedilospora* to other established genera in the Mucedinaceae-Staurosporae remain conjectural, there can be no reasonable doubt that *P. dactylopaga* is a close relative of the nema-capturing form having broad conidia with four divergent lobes that was figured earlier (4: Fig. 9, A, C). In mycelial as in sporulating habit, both in pure and in mixed cultures, the similarity between the two forms is unmistakable. Through further comparison the similarity is seen to extend to the delicate nema-capturing fungus figured in another publication (6: Fig. 16) and later discussed (7) as a species of *Monacrosporium*, the conidia of which, it may be noted here, are occasionally distally bifurcate in a manner suggestive of *Pedilospora*. Evidently *P. dactylopaga* and presumably also its three previously described congeners, might be regarded as having been derived through modification of the narrow-spored type of *Monacrosporium*. Likewise the predacious form with regularly broad quadrilobate conidia could be looked upon as derived from the wide-spored type of *Monacrosporium* represented, for example, in the nema-capturing fungus (4: Fig. 7) apparently first described by Grove (9) as *Dactylella ellipsospora* and later by Bubák (1) as *M. leporinum*. The latter fungus shows such close correspondence in morphology and predacious character to the loosely capitate nema-capturing form (4: Fig. 6) identified (7) as *Dactylaria candida* (Nees) Sacc., that an intimate natural relationship is sufficiently obvious. Equally evident from the many conspicuous resemblances would seem a close relationship of *D. candida* to some loosely capitate, monocephalous, long-spored species of *Arthrobotrys* (4: Fig. 4; 5: Fig. 13); and through them to some compactly capitate, mostly monocephalous shorter-spored species of *Arthrobotrys* (4: Figs. 2, 3), and finally to the densely capitate, short-spored, repeatedly nodose

A. oligospora Fres. In fine, the fungus herein described as new is to be reckoned among the group of intimately interrelated predacious Hyphomycetes exemplified in the last-named species, whose ready appearance on decaying organic substrata has helped to make its remarkable conidial apparatus familiar to mycologists everywhere.

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BOTANY.—*The dental plant of the Citará Indians in Colombia.*[1]

W. Andrew Archer. (Communicated by E. P. Killip.)

In March, April, and May of 1931 a visit was made by the author to the Intendencia del Chocó, an area in northwestern Colombia but slightly known scientifically, for the purpose of collecting herbarium material.

In the vicinity of Quibdó, the capital of the Chocó, lives the Citará tribe of Indians, who are noted for their jet black teeth, a condition which is produced by chewing the young shoots of a liana. The plant is known to the Indians as "querá," or "quedá," these terms being derivatives of the word *quidai*, meaning tooth.

The use of the "querá" plant is an integral part of the life of these Indians, just as the use of a toothbrush and dental paste is a part of American hygiene. The Citará children are taught to chew the plant until a complete blackening of the teeth occurs, but after that time

[1] Received May 28, 1934. Much credit is due Sr. Rudolfo Castro of Quibdó who rendered great service in securing data and flowering material of the plant.